

PapMV coat protein being capable of multimerization to form said VLP, and wherein said immune response is a humoral and/or cellular response.

21. (previously presented) The method of claim 20, wherein said PapMV is a wild-type virus.

22. (previously presented) The method of claim 20, wherein said PapMV is a recombinant virus.

23. (previously presented) The method of claim 20, wherein said PapMV is a pseudovirus.

24. (previously presented) The method of claim 20, wherein said antigen is an immunogen.

25. (currently amended) The method of claim 20, wherein said antigen is fused to a coat protein of said PapMV, or to said PapMV coat protein or modified PapMV coat protein of said VLP.

26. (cancelled)

27. (previously presented) The method of claim 20, wherein said antigen is covalently attached to said PapMV or VLP.

28. (previously presented) The method of claim 20, wherein said antigen and said PapMV or VLP are not linked.

29. (previously presented) The method of claim 20, wherein said antigen and said adjuvant are administered parenterally, enterally or orally to said animal.

30. (previously presented) The method of claim 20, wherein said immune response is systemic.

31. (withdrawn) The method of claim 20, wherein said immune response is a mucosal immune response.

32. (previously presented) The method of claim 20, wherein said immune response is a humoral immune response.

33. (previously presented) The method of claim 20, wherein said immune response is a cellular immune response.

34. (previously presented) The method of claim 20, wherein said antigen is a viral, a bacterial or a parasitical protein, or fraction thereof.

35. (previously presented) The method of claim 20, wherein said antigen and said adjuvant are co-administered to said animal.

36. (previously presented) The method of claim 20, wherein said adjuvant is administered to said animal prior to administration of said antigen.

37. (previously presented) The method of claim 20, wherein said adjuvant is administered to said animal subsequent to administration of said antigen.

38. (previously presented) The method of claim 20, wherein said animal is a mammal, bird or fish.

39. (previously presented) The method of claim 38, wherein said animal is a mammal.

40. (withdrawn) The method of claim 38, wherein said animal is a bird.

41. (withdrawn) The method of claim 38, wherein said animal is a fish.
42. (previously presented) The method of claim 20, wherein said animal is a human.
43. (currently amended) The method of claim 20, wherein ~~said PapMV coat protein is a~~ said VLP comprises modified PapMV coat protein, said modified PapMV coat protein being capable of multimerization to form said VLP.
44. (new) The method of claim 20, wherein said antigen is fused to the C-terminus of a coat protein of said PapMV, or to the C-terminus of said PapMV coat protein or modified PapMV coat protein of said VLP.
45. (new) The method of claim 20, wherein said antigen and said adjuvant are administered parenterally to said animal.
46. (new) The method of claim 20, wherein said one or more B-cell antigenic epitopes and/or one or more T-cell antigenic epitopes are hepatitis C virus antigenic epitopes or *Salmonella typhi* antigenic epitopes.
47. (new) The method of claim 20, wherein said cellular response is a cytotoxic T lymphocyte response.
48. (new) A method of potentiating a humoral and/or cellular immune response against an antigen comprising one or more B-cell antigenic epitopes and/or one or more T-cell antigenic epitopes in an animal, said method comprising the step of administering to said animal said antigen and an effective amount of an adjuvant, wherein said adjuvant is a virus-like particle (VLP) comprising modified PapMV coat protein, said modified PapMV coat protein being capable of multimerization to form said VLP, and wherein said antigen is fused to the C-terminus of said modified PapMV coat protein.

49. (new) The method of claim 48, wherein said antigen and said adjuvant are administered parenterally to said animal.

50. (new) The method of claim 48, wherein said animal is a mammal.

51. (new) The method of claim 48, wherein said animal is a human.

52. (new) The method of claim 48, wherein said antigen is a viral, a bacterial or a parasitical protein, or fraction thereof.

53. (new) The method of claim 48, wherein said one or more B-cell antigenic epitopes and/or one or more T-cell antigenic epitopes are hepatitis C virus antigenic epitopes or *Salmonella typhi* antigenic epitopes.

54. (new) The method of claim 48, wherein said cellular immune response is a cytotoxic T lymphocyte response.

**In the Specification:**

Please amend paragraphs 0031 and 0032, at page 7, as follows:

[0031] Figs. 2 illustrate tricine SDS-PAGE analysis of PapMV CP\_(A) and immunogold ~~labeling~~ labelling showing that the fusion is exposed at the surface of the PapMV VLP (B);

[0032] Figs. 3A to ~~3G~~ 3F illustrate electron micrographs of PapMV and PapMV VLP assembled *in vitro*;

Please amend paragraph 0047, spanning pages 10 and 11, as follows:

[0047] According to the present invention, it is possible to immunopotentiate, or boost an immune reaction against a given antigen. It is known particularly that small molecules often act only poorly as immunogens in their ability to elicit antibodies in an *in vivo* system. When attached to a immunogen-carrier virus of the present invention, that itself is antigenic, it will give rise to improved antibody response to the smaller molecule. The small molecule attached to the immunogen-carrier in this system-, may be called a hapten or antigen, and can vary in size from small to quite large. In one example of this combination, of interest to the health care field, a small portion of the Hepatitis B surface antigen, comprising a sequence of determined amino acids, which is itself not antigenic, can be covalently bound to the VLP, ~~keyhole limpet immunogen-carrier~~, and the resulting conjugate ~~elicites~~ elicits antibodies in an *in vivo* system that may cross-react with the native surface antigen of the VLP and also strongly with the whole hepatitis virus. This system of immunogen-carrier can be the basis for an effective vaccine against a disease for which the hapten or antigen codes.

Please amend paragraph 0063, at page 14, as follows:

[0063] Preferably, a polynucleotide coding for the immunogen portion is inserted at or adjacent a terminus of the polynucleotide coding for the viral portion, such that upon translation, the fusion protein has the viral portion at one end and the immunogen portion at the opposite end. It is not necessary for the viral portion to comprise a whole virus ~~coat~~ coat protein, but this remains an alternative choice.

Please amend paragraph 0077, spanning pages 18 and 19, as follows:

[0077] Experimental data using the air pouch model in mice dorsum demonstrated that PapMV enhances the inflammatory response and favors the

migration of phagocytes to the inoculation site (Fig. 6). This result confirms that PapMV induces by itself an inflammatory episode, thus eliminating the need for additional adjuvant strategies aiming at improving antigen presentation by antigen-presenting cells. Similar results were obtained with viral-like particles (VLPs) harboring the fusion of- specific peptides generated *in vitro* from recombinant proteins (Fig. 6). The recruitment was very fast since we observed the maximum of cells between 6 to 9 hours after the treatment (data not shown). Furthermore, PapMV-particles are efficient to induce an immune response to ovalbumin, a protein known to be non-immunogenic (Fig. 7). This was established by injecting mice (Balb/C) by intraperitoneal route with 2 mg of ~~Ovalbumin~~ ovalbumin, a protein known to be a very weak immunogen, or in ~~combinaison~~ combination with 50 or 100 ~~ag~~ µg of PapMV. We injected 6 mice per treatment and collected samples at 0, 4, 8, 12 and 20 days after the injection. Only one injection was made for each treatment. We detected a two times stronger immune response to ~~ovalbumine~~ ovalbumin in the presence of PapMV even if ~~ovalbumine~~ though ovalbumin is a weak immunogen.

Please amend the heading preceding paragraph 0084, at page 21, as follows:

#### **EXAMPLE IV**

##### **Immunization against ~~thyphoid~~ Typhoid**